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WHAT IS CLAIMED IS:

1.   A fluid discharge method for intermittently discharging fluid by making the fluid fed from a fluid supply device to a gap defined between opposed relatively moving surfaces of two members while keeping the two members moving relative to each other along a direction of the gap, and by utilizing a pressure change caused by changing the gap so that the fluid is intermittently discharged through a discharge port communicating with the gap, wherein

the opposed relatively moving surfaces of the two members are provided in n sets, where n is an integer not less than 1, and wherein given a total volume V_1 (mm^3) of the n sets of opposed relatively moving surfaces, a total volume V_2 (mm^3) of flow passages that connect the n sets of opposed relatively moving surfaces and the fluid supply device to each other, an absolute value X_{st} (mm) of a stroke of the n sets of relatively moving surfaces that move relative to each other, a time T_{st} (sec) required for the n sets of relatively moving surfaces to move by the stroke X_{st}, a fluid internal resistance R_S (kgsec/mm^5) of the fluid supply device, a fluid resistance R_n (kgsec/mm^5) of the discharge port, a modulus of elasticity of volume K (kg/mm^2) of the fluid, an effective area S_P (mm^2) of the relatively moving surfaces, and a sum P_{so} (kg/mm^2) of a

maximum pressure of the fluid supply device and an auxiliary pressure for introducing the fluid into the fluid supply device, if it is defined that $V_s = V_1 + V_2$ and that a time constant T and an intermittent interception control parameter II_c are

$$T = \frac{R_s R_n}{R_n + nR_s} \frac{V_s}{K}$$

and

$$II_c = \frac{R_s S_p X_{st}(1 - e^{-\frac{T_{st}}{T}})}{2P_{s0}T_{st}},$$

respectively, then it holds that $II_c > 1$.

2.   The fluid discharge method according to Claim 1, wherein

$$P_{s0} + \frac{S_p X_{st} K}{2V_s} > 0.2$$

3.   A fluid discharge method for continuously discharging fluid by making the fluid fed from a fluid supply device to a gap defined between opposed relatively moving surfaces of two members that move relative to each other along a direction of the gap so that the fluid is continuously discharged through a discharge port communicating with the gap, wherein

the opposed relatively moving surfaces of the two

members are provided in n sets, where n is an integer not
less than 1, and wherein given a total volume V_1 (mm^3) of
the n sets of opposed relatively moving surfaces, a total
volume V_2 (mm^3) of flow passages that connect the n sets of
5   opposed relatively moving surfaces and the fluid supply
device to each other, an absolute value X_{st} (mm) of a
stroke of the n sets of relatively moving surfaces that
move relative to each other, a time T_{st} (sec) required for
the n sets of relatively moving surfaces to move by the
10   stroke X_{st}, a fluid internal resistance R_S ($kgsec/mm^5$) of
the fluid supply device, a fluid resistance R_n ($kgsec/mm^5$)
of the discharge port, a modulus of elasticity of volume K
(kg/mm^2) of the fluid, an effective area S_P (mm^2) of the
relatively moving surfaces, and a sum P_{s0} (kg/mm^2) of a
15.   maximum pressure and an auxiliary pressure of the fluid
supply device, if it is defined that $V_s = V_1 + V_2$ and that a
time constant T and a continuous interception control
parameter CI_c are

$$T = \frac{R_s R_n}{R_n + nR_S} \frac{V_s}{K}$$

20   and

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$$CI_c = \frac{R_s S_p X_{st}(1 - e^{-\frac{T_{st}}{T}})}{P_{s0} T_{st}},$$

respectively, then it holds that $CI_c > 1$.

4.   A fluid discharge method for continuously or intermittently discharging fluid by making the fluid fed from a fluid supply device to a gap defined between opposed relatively moving surfaces of two members that move relative to each other along a direction of the gap so that the fluid is continuously or intermittently discharged through a discharge port communicating with the gap, wherein

the two members that move relative to each other in the gap direction are provided in n sets, where n is an integer not less than 1, and wherein given a total volume V_1 (mm^3) of the n sets of relatively moving surfaces, a total volume V_2 (mm^3) of flow passages that connect the n sets of relatively moving surfaces and the fluid supply device to each other, a fluid internal resistance R_S ($kgsec/mm^5$) of the fluid supply device, a fluid resistance R_n ($kgsec/mm^5$) of the discharge port, a fluid resistance R_P ($kgsec/mm^5$) of radial flow passages that connect the discharge port and outer peripheries of the relatively moving surfaces to each other, and a modulus of elasticity

of volume K (kg/mm²) of the fluid, and if it is defined
that $V_s = V_1 + V_2$ and that a time constant T is

$$T = \frac{R_s R_n}{R_n + R_P + nR_S} \frac{V_s}{K} ,$$

then it holds that $T \leq 30$ msec.

5   5.   The fluid discharge method according to Claim 1,
wherein in a multi-head for making the fluid fed from the
single fluid supply device to the gaps between the plural
opposed relatively moving surfaces in which $n \geq 3$, the
mutually generally parallel flow passages are formed so as
10   to lead from a common flow passage arranged on a way
between the fluid supply device and the plural opposed
relatively moving surfaces so as to communicate with the
fluid supply device on its upper stream side and
communicate with the individual relatively moving surfaces
15   on its lower stream side in such a manner that fluid
resistances of the individual flow passages are equal to
one another.

6.   The fluid discharge method according to Claim 1,
wherein in a multi-head for making the fluid fed from the
20   single fluid supply device to the gaps between the plural
opposed relatively moving surfaces in which $n \geq 3$, at least
one of the flow passages are formed in a bent configuration
so that fluid resistances of the individual flow passages

are equal to one another.

7.   The fluid discharge method according to Claim 1, wherein an axial drive device for relatively moving the opposed relatively moving surfaces is implemented by using an electro-magnetostriction element, and $T \leq 30$ msec.

8.   The fluid discharge method according to Claim 7, wherein the discharge fluid is intermittently flown and discharged onto a substrate, which is a discharge target, with a cycle period $T_P = 0.1$ to 30 msec in a state that viscosity μ of the of the discharge fluid is $\mu > 100$ mPa·s, diameter ϕd of powder material contained in the discharge fluid is $\phi d < 50$ μm, flow passages between the relatively moving members keep mechanically completely contactless during discharge process, and that a gap H between a discharge nozzle serving as the discharge port and the discharge-target substrate is $H \geq 0.5$ mm.

9.   The fluid discharge method according to Claim 1, wherein a continuous flow supplied from the fluid supply device is converted into an intermittent flow by utilizing the pressure change due to a change in the gap of the relatively moving surfaces, and wherein intermittent discharge amount per dot is controlled by setting of pressure and flow-rate characteristics of the fluid supply device.

10.   The fluid discharge method according to Claim 9,

wherein the fluid supply device is a pump which allows the flow rate to be changed by its rotating speed.

11.   The fluid discharge method according to Claim 10, wherein the fluid supply device is a thread groove pump.

5   12.   The fluid discharge method according to Claim 1, wherein the flow rate for each one shot is set by changing the rotating speed of the fluid supply device.

13.   The fluid discharge method according to Claim 1, wherein the axial drive device is a resonant oscillator.

10 14.   The fluid discharge method according to Claim 1, wherein while a discharge nozzle serving as the discharge port and a discharge-target substrate are kept moving relative to each other, the fluid of an equal discharge amount per dot is intermittently discharged periodically by

15 taking advantage of the discharge-target surface's geometrical symmetry.

15.   The fluid discharge method according to Claim 1, wherein the discharge-target surface is a display panel.

16.   The fluid discharge method according to Claim 1,

20 the method being a method for forming a fluorescent material layer of a plasma display panel, wherein while a dispenser having a discharge nozzle serving as the discharge port is kept moving relative to a discharge-target substrate on which independent ribs surrounded by

25 barrier ribs are geometrically symmetrically formed,

fluorescent material paste as the fluid is intermittently discharged from the discharge nozzle so that the fluorescent material paste is discharged into interiors of the independent cells successively, whereby a fluorescent

5   material layer is formed.

17.   The fluid discharge method according to Claim 1, wherein if volume of a flow passage that connects the fluid supply device and one piston forming the gap of the relatively moving surfaces is V_{2S}, then it holds that $10 <$

10    $V_{2S} < 80$ mm^3.

18.   The fluid discharge method according to Claim 1, wherein if a setting range of a minimum value or mean value h_0 of the gap over which discharge amount per dot Q_s is largely affected by a size of the minimum value or mean

15   value h_0 of the gap is $0 < h_0 < h_x$, and if a setting range of h_0 over which the discharge amount per dot Q_s is approximately equal even to changes in the gap h_0 is $h_0 > h_x$, then the fluid is intermittently discharged with the gap set within a range of $h_0 > h_x$.

20   19.   The fluid discharge method according to Claim 18, wherein h_x is an intersection point between an envelope of a discharge amount Q_s curve against h_0 in a region of $0 < h_0 < h_x$ and $Q_s = Q_{se}$ at $h_0 \rightarrow \infty$.

20.   The fluid discharge method according to Claim 1,

25   wherein if a minimum value or mean value of the gap of the

relatively moving surfaces is h_0, then $h_0 > 0.05$ mm.

21.   A fluid discharge apparatus comprising:

        two members which have n sets of opposed relatively moving surfaces for moving relative to each other along a direction of a gap formed between the n sets of opposed relatively moving surfaces; and

        a fluid supply device for feeding fluid via a suction port to between those n sets of opposed relatively moving surfaces, with a discharge port provided at any one of the relatively moving surfaces,

        wherein n is an integer not less than 1, and wherein given a total volume V_1 (mm^3) between the n sets of opposed relatively moving surfaces, a total volume V_2 (mm^3) of flow passages that connect the gap between the n sets of relatively moving surfaces and the fluid supply device to each other, a fluid internal resistance R_S ($kgsec/mm^5$) of the fluid supply device, a fluid resistance R_n ($kgsec/mm^5$) of the discharge port, a fluid resistance R_P ($kgsec/mm^5$) of a radial flow passage that connects the discharge port and outer peripheries of the relatively moving surfaces to each other, and a modulus of elasticity of volume K (kg/mm^2) of the fluid, if it is defined that $V_s = V_1 + V_2$ and that a time constant T is

$$T = \frac{R_s R_n}{R_n + R_P + nR_s} \frac{V_s}{K} \quad ,$$

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then it holds that T ≤ 0.03.

22.   A fluid discharge apparatus, comprising: an axial
drive device for giving an axial-direction relative
displacement to between a shaft and a housing, with a

5   discharge chamber defined by a shaft end face and the
housing; and a fluid supply device for supplying fluid to
the discharge chamber, with a flow passage for
communicating the discharge chamber and the fluid supply
device with each other, and with a suction port formed in

10   the fluid supply device, and with a discharge port for
communicating the discharge chamber and outside with each
other,

       wherein an opening area of the flow passage
formed between the shaft and the housing is changed by an

15   axial-direction relative move of the shaft and the housing,
and the opening area becomes smaller at a discharge end
stage than that at a suction end stage.